REMARKS-General

By the above Amendment, Applicants have corrected typographic errors and amended the claims to more distinctly claim the invention and define it patentably over the prior art.

The Rejection of Claims 1 and 2 under § 112

The Office Action rejects claims 1 and 2 as being indefinite for failing to particularly point out and distinctly claim the subject matter regarded as the invention.

The order of the first two claims has been interposed to introduce first that which the applicants consider to be the broadest claim.

Claims 1 and 2 have been rewritten to recite definitively the elements that distinguish the invention over the prior art. Both claims previously had recited " vacuum tubes, semiconductors, and optical devices". As the described embodiment uses a vacuum tube as the amplifying device, all claims accordingly now reflect the described embodiment. Applicants' previous inclusion of these other devices anticipated alternative embodiments, in which the active voltage amplifying element of the amplifying circuit might be a semiconductor such as a transistor, or still-in-development optical devices, which many expect to replace transistors as the basis for computers. Such alternative embodiments as may fulfill the other aspects of the claims are not reduced to practice, and the limitations of the prior art will make *simultaneous* fulfillment of all aspects of the claims very difficult.

The present invention constructed and operated as taught in the specification, fulfills all the claims simultaneously.

In claim 5, the definite "are measured" replaces the unclear "arranged to directly measure".

In claim 6, the definite "voltages are" replaces the indefinite phrase "voltages may be".

Also in claim 6, the definite "earth's atmospheric voltages" replaces the indefinite "atmospheric voltage."

In the last sentence regarding the Section 112 rejection, "For purposes of examination, the Examiner assumes that any atmosphere voltage may be measured..." it is not clear whether the Examiner intends this to be interpreted as "any voltage" or "any atmosphere." If interpreted as "any voltage," certainly all meters have limitations in voltage maximums, and the claim is not intended to encompass "any voltage." If interpreted as "any atmosphere," any atmosphere situated between the antenna and earth ground (or their electrical equivalents) would be measured for voltage. Although this voltage and corresponding current appears to be between the two points of measurement, and is easily visualized as a voltage between the two points, the situation is more complex. Because of the extremely high impedance of the external circuit, it is not only the voltage in the shortest path that is measured. Many external paths and influences exist at such high impedances, and a voltage measured is a vector sum rather than a simple matter of amplitude and polarity. Measured between two points, the vector sum of the voltages expressed as a single voltage may be likened to measuring the distance between two points without defining the nature of the path between the two points. Unless measures are taken to define a specific atmosphere, a voltage impressed into one the many possible external circuits may far greater influence the resulting reading than the voltage intended to be measured in a particular subject. Strategic placement of the measurement points and amplifying circuit, physical isolation of the test atmosphere, electrical insulation of the test atmosphere, earth grounding, or isolation from earth grounding may be singly or in combination necessary to ensure an intended atmosphere is measured.

Clarification of Conducive vs. Conductive

The second half of the Examiner's sentence, "... informing users (including anglers) to the presence of condition conductive in any environment including fish feeding." brings into question whether the Examiner has perhaps misread or mis-typed the word *conducive* as *conductive*. The measurement of condition(s) *conductive* would suggest an ohm-meter, but this is incorrect. Applicants use of the word *conducive* was intended to describe naturally occurring conditions *conducing, contributing, tending to, or helpful to* stimulate fish feeding. The same conditions may influence other physiological aspects yet unknown, and different conditions of voltage and polarity may be conducive to other situations or responses.

The Rejection of Claims 1-4 under § 103

The Office Action rejects claims 1-4 as being unpatentable over Blackwell et al (3,449,668).

Regarding Claim 1, "Blackwell et al discloses a non-contact voltmeter comprising the amplifying circuit (Figure 5), containing a device (39,40) selected from the group consisting of vacuum tubes. whereby atmospheric voltages "may be" measured, informing anglers to the presence of conditions conducive to the natural stimulation of fish feeding. "

Blackwell's device voltage indicating, not voltage amplifying

Had claim 1 previously restricted devices to vacuum tubes and definitively declared the result of measurement, the invention claimed would distinguish over Blackwell by "amplifying" the input signal. Blackwell's specification states, "The principle of operation is based upon the circuit characteristics of the inverted tube" (col. 3, ll. 24-25). In the non-patent literature reference provided, "Radio Engineering" by F. E. Terman, on page 149 the characteristics of the inverted tube are discussed. "The principle differences in the result are that the amplification factor is low, being approximately $1/\mu$, where μ is the amplification factor of the tube operated in the normal manner..." Blackwell's tubes in the circuit do not multiply the voltage sensed; they divide it, and present the result as meter deflection. This is advantageous for Blackwell's intended application, where the accumulated charges expected are commonly thousands of volts. Again quoting the reference F. E. Terman, "The inverted vacuum tube is a useful laboratory tool when it is necessary to control a current by a very high voltage without at the same time consuming any energy from the high potential source."

The rejection of Claim 1 on Blackwell is Overcome

Claim 6, replacing claim 1, distinguishes over Blackwell in defining a different circuit, reciting the earth ground and antenna directed to a different use. Blackwell's specification states, "The orifice cap 37 is grounded to the metallic housing 10 as indicated at 69"(col. 3, ll. 23-25), and further "The radio active isotope on the sensing disc 33 ionizes the air in the orifice cap 37 to produce a low resistance contact to the charged ions in the air and result in a current flow to the plate-screen-grid combination 60 of the tube 40 which reflects on the voltmeter 14, both the polarity and amplitude of the atmospheric charge in direct proportion to the size of the electron opening 38" (col. 4, ll. 13-19).

The path described is internal to the device, confirmed by Blackwell's claim 7, which refers to "...the atmosphere enclosed between said sensing disc and said orifice cap" (col. 6, ll. 10-12). Claim 6 defines over Blackwell under Section 103 since at no time does Blackwell suggest a terminal, housing, or any element be electrically connected to a true earth ground, necessary as a voltage reference if earth's atmosphere is to be measured. The symbol used by Blackwell is for an earth ground, but when not connected to earth, should be shown as a symbol like the antenna (57) in the present invention, inverted. This is called a *chassis* ground.

Blackwell makes no reference to earth's atmosphere, elevating the device relative to the earth, or replacing the sensing disc (33) with an antenna external to the device.

Blackwell's references in the Abstract and Description teach use of the device "...brought into proximity to a subject..."(col. 1 l. 21-22)"...wherever such charges accumulate without it being necessary to contact the suspected surface or product" (col. 1 l.32-33).

Connecting an antenna and earth ground to the circuit would not provide sufficient sensitivity to indicate earth's atmospheric voltage, due to the voltage gain of less than 1.0 imposed by the amplifier circuit arrangement intended for use in measuring high voltages.

The present claim 6 further distinguishes the present invention over the prior art in relating earth's atmospheric voltage to the stimulation of fish.

Applicants submit that claim 6 is allowable over the cited reference and solicit reconsideration and allowance.

Regarding Claim 2, the Office Action states, "Blackwell et al discloses (Figure 5) an antenna (33), an earth ground (69). and a device selected from the group consisting of vacuum tubes (39.40), arranged to directly measure atmospheric voltage."

Claim 5 replaces claim 2, and has been rewritten in the same spirit as claim 1, to remove reference to alternative embodiments, and to distinctly, definitely claim the subject matter applicants properly regard as the invention. Had claim 2 previously restricted devices to a vacuum tube specifically operated and definitively declared the result as measurement, the invention would have distinguished over the prior art referenced in that the present invention utilizes only the naturally occurring conductivity in the vicinity of the probe. and does not introduce any sort of active voltage upon the antenna. As taught in the specification on Page 2, "The prior art has employed various methods to provide sufficient sensitivity to measure small charges". The circuit insensitivity of the prior art cited makes necessary a hazardous element to increase current flow, in this case, a radioactive antenna. The hazard of a radioactive element or high voltage supply for the antenna is not necessary with the present invention.

Conductivity enhancement of Antenna no longer necessary

The novel advantage enjoyed by the structure and operation of the present invention is the non-contact measurement of voltage without enhancing conductivity of the air in the vicinity of a probe. Standardized heater voltages are considered a defined parameter to be adhered to. As the tubes used by the prior art were operated at standard cathode temperatures, an abundance of electrons were emitted by the cathode, and an abundance of electrons were collected by the control grid. The accumulating negative charge made bias batteries or a grid leak resistor necessary, which permitted adjusting the operating setpoint of the tube's plate current flow, but added impedance to the grid circuit, making it harder for electrons to communicate freely in a control grid circuit or antenna. This weakness was addressed in Blackwell's invention by an ionizing element. Blackwell's electrical equivalent of the antenna (33) is a disc with a radio-active isotope such as tritium, to ionize the air in its proximity.

The present invention makes this element, or any equivalent means of ionization unnecessary.

Claim 5 distinguishes the present invention over Blackwell under § 103 by using only naturally occurring conductivity

The present invention is sensitive enough to measure voltage without conductivity enhancement because operating the heater and cathode at levels far lower than standard practice minimizes the number of electrons collected by the control grid. As discussed in OPERATION OF THE INVENTION, (pg. 7-8) "In usual practice, the voltages applied to a vacuum tube, while permitting use in high impedance circuits. still permit too much grid current to flow to allow atmospheric potentials to control the conduction of a tube. In this invention, both heater and plate voltages are kept to such low levels as to permit only a very low level of conduction, such that the flow of electrons in the tube is readily controlled by the charge introduced upon the third grid by the antenna. *Control grid current is not eliminated by this operating condition, but reduced to a level that atmospheric currents provide the return path for these electrons in the control grid circuit.*"

Applicants submit that claim 5 is allowable over the cited reference and solicit reconsideration and allowance.

Regarding Claim 3, the Office Action states ,"Blackwell discloses a voltage-amplifying circuit (figure 5) consisting of a vacuum tube (39,40) operated at substantially reduced cathode temperature and electron emission (The limitation is true for any prior art of vacuum tube include the vacuum tubes 39 and 40 of Blackwell), the sole path for electron communication between the control grid being provided by the specific environment to be measured (Any environment is specific environment to be measured)."

The Rejection of Claim 3 on Blackwell is Overcome in 3 ways

As discussed in the response to the Claim 1 rejection, the circuit Blackwell's voltmeter uses is based on an *inverted tube*, where the voltage gain is always less than 1.0, and should be properly be described as voltage-attenuating, rather than voltage amplifying.

The first way the present invention distinguishes over the cited prior art is by amplifying the input signal in a circuit providing a voltage gain of greater than 1.0, commonly referred to as voltage amplification.

The second and third ways the present invention distinguishes over the prior art are interrelated.

The second way that the current invention distinguishes over Blackwell is operating the cathode at a substantially reduced emission level. The advantage to operating a tube this way is the great reduction in grid current. Any tube in operation will create grid current, which must return to the circuit through bias batteries, grid leak resistor or other circuit element. The impedance provided by either bias battery or grid leak resistor is so much lower than a non-contact environment that the only meaningful voltage applied to the grid. by proportion, is that applied by the bias batteries or developed across the grid leak resistor. A circuit so configured is unable to measure voltages at impedances greater than that of the grid leak resistor or bias battery.

Operating a tube at the substantially reduced conduction described makes it possible for *all* of the electrons in the control grid circuit to return to the negative side of the circuit through the air, earth, and other conductive and semiconductive paths. This communication of electrons establishes that the voltage present at an antenna and that conducted to a control grid will be the same.

Blackwell does not specify a low cathode temperature, or teach any specific operation point. Blackwell does specify a 1.34 volt mercury filament battery (28), but not the tube type, making it necessary to presume the tube type specifies this voltage. Blackwell's circuit provides no means to regulate filament voltage.

All vacuum tubes conform in manufacture to design standards, and operation characteristics are published for all types, specifying certain definite conditions of voltages.

The filament voltage, and for heater types, the heater voltage listed is intended to produce in either case an abundance of electrons emitted from the cathode. This is one of the certain definite conditions of voltage which is held constant while other voltages are varied to produce changes in the operation of a tube.

The possibility of using a lower cathode temperature to achieve a different result or permit simplification of an amplifier circuit is not taught in the prior art.

The third way in which the present invention distinguishes over the cited prior art reference is that the sole path for electrons in the control grid circuit to return to the negative side of the circuit is through the environment to be measured. This is another way of stating that no grid leak resistor is used.

Decreasing the cathode temperature, and electron emission of the cathode, permits elimination of the grid leak resistor from the input circuit of a tube so operated. Eliminating this resistor removes undesirable loading from the input, so the voltage at the grid of the tube is the voltage of the subject, not a voltage derived as a result of current flow through a grid leak resistor.

A grid leak resistor develops a voltage as a result of the grid current flowing through it.

A voltage to be input to a tube with a grid leak resistor will also develop current in the resistor.

Any tube circuit with a grid leak resistor will combine these component voltages at the control grid, while a tube circuit that successfully eliminates the grid leak resistor is able to amplify a desired signal unencumbered by the component voltages developed in the resistor.

In the prior art reference, Blackwell's circuit connects the control grids of the two tubes to the bridge circuit and meter, as his specification states, "The positive terminal of the first bias battery 26 is connected, as indicated at 52, to the wiping brush contact of potentiometer 19 to controllably supply positive current to grids 44 and 46" (col. 3 ll. 7-9). The control grids of the tubes as applied by Blackwell do not communicate electrons in any way with the environment to be measured.

As an inverted tube configuration, only the plate and screen grid of tube 40 communicate electrons with the environment to be measured.

Applicants therefore submit that Claim 7 is allowable over the cited reference and solicit reconsideration and allowance.

Regarding claim 4, the Office Action states, "Blackwell discloses a voltmeter comprising a vacuum tube amplifying circuit (figure 5), with the vacuum tube (39, 40) operated at substantially reduced cathode temperature and electron emission, said circuit arranged to develop a voltage for indication by meter (figure 2)."

The rejection of Claim 4 on Blackwell is Overcome

Claim 8 replaces claim 4. The previously stated distinctions applicable to claim 7 apply equally. To restate briefly: Blackwell's circuit arrangement is not capable of producing voltage gain greater than 1. The prior art teaches adherence to the standard tube heater or filament voltages. Blackwell makes no specification regarding cathode temperatures or emission.

Different range of voltage defines different Use

It is important to consider that Blackwell's device was intended to measure accumulated charges on objects typically thought of as non-conductive, where the voltages encountered are commonly thousands of volts. As Blackwell's amplifier is arranged to operate a meter, the choice of a circuit where the voltage is divided rather than multiplied indicates design toward a different use. The present invention is directed toward the measurement of much lower voltages.

Claim 8 further distinguishes over Blackwell by claiming the voltage amplifier as producing a control voltage. This is using the voltage developed in the plate circuit load to control a process, rate, condition, detection, or other function where the sensing of a charge is a parameter that is useful for control.

Blackwell does not teach in his specification that the housing be electrically connected to any member of a test machine, positioning the device in a fixed manner near a running process, or replacing the meter with a resistor to develop a control voltage.

Applicants submit therefore that Claim 8 is allowable over the cited reference and solicit reconsideration and allowance.

Miscellaneous Remarks Pertinent to § 103 Considerations

Present-Day applications

The present use of solid-state voltmeters for this application is evidence that the current state of the art regards vacuum tube technology as fully exploited and obsolescent. An unwillingness to utilize an older technology for the reason that it is old ignores possible superior aspects. Semiconductor characteristics make them superior for some applications, while the electron mobility of vacuum tubes makes them superior for other applications.

The current state of the art voltmeters utilize semiconductors despite the technology's known dead-band problem and limited electron mobility within semiconductors, indicating that the current state of the art does not recognize the advantage of providing higher electron mobility in measuring low voltages at high impedance.

The fact that current non-contact voltmeters use some means of conductivity enhancement indicates that heretofore no way has been developed to improve electron mobility within the amplifier circuit.

It is unexpected that an older technology will provide any advantage over newer ones, and frequently technology changes before full advantage is realized from older technologies. When the prior art adopts a newer technology, it is generally considered advancement, and adopted routinely in all subsequent development.

Applicants submit that it is unobvious to explore obsolete technologies to develop unrealized advantages or solutions to problems.

Earlier Applications

Vacuum tubes have not seen active development of new applications since the 1970s.

The absence of vacuum tube voltmeters with an open grid circuit indicates that the state of the art does not yet recognize the advantage of eliminating input resistances. The presence of such a resistor is considered to be a standard part of a circuit, even though it limits circuit electron mobility much in the same way as a semiconductor's crystalline structure. That such a resistor might be eliminated was not considered because it could not be eliminated with standard tube filament/heater voltages, nor was it ever considered there might be any advantage in eliminating it. The present invention eliminates this element and its disadvantages, and makes a circuit configuration otherwise unworkable into a stable, highly sensitive amplifier. It also eliminates conductivity enhancing means or elements used in vacuum tube non-contact voltmeters.

Applicants submit that because of the superior sensitivity exhibited by the present invention, it is unobvious because no vacuum tube related prior art specifies such conduction levels, open grid circuit, why such particulars are necessary, or the advantages to be realized.

The prior art does not suggest there might be any advantage to operating a tube at a non-standard temperature, or that it is an effective way to regulate a tube circuit.

It would be easy to presume that operating a tube at a lower temperature would make it less sensitive, but the surprising, unexpected result is that for a non-contact, high-impedance application, the sensitivity is greatly increased.

If the superior advantages of this circuit had been realized when vacuum tube application was contemporary, it would surely have been implemented and still be in use, resisting replacement by solid-state technology due its superior electron mobility.

Applicants submit also that invention is unobvious over the prior art because there was no recognized need to measure lower voltages at such high impedances. The present invention is the first circuit to successfully eliminate input resistances in series or parallel, in order to permit the impedance of earth's atmosphere to complete the input circuit electrically.

Conclusion

For all the above reasons, applicants submit that errors in the specification have been corrected, the claims comply with section 112, and the claims define distinctions of patentable merit under section 103. Accordingly. applicants submit that this application is now in full condition for allowance. which action they respectfully solicit.

Conditional Request for Constructive Assistance

Applicants have amended the claims so that they are definite, proper and define novel structure and operation which is unobvious. If this is application is believed for any reason to not be in full condition for allowance, applicants respectfully request the constructive assistance and suggestions of the Examiner pursuant to M.P.E.P. § 707.07 (j) in order that the undersigned can place this application in allowable condition as soon as possible.

Very Respectfully,

Thomas J. Wells Robert Scott Elliott

---------- Applicants Pro Se ----------

5036 N. Albany Ave.
Chicago, Illinois 60625
Telephone (773) 588-7792